17

NOTES

ON

SLOCATIONS OF THE THUMB.

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NOTES

ON

DISLOCATIONS OF THE THUMB.

DISLOCATION at the metacarpo-phalangeal articulation of the thumb is a subject of such persistent interest, that the following observations may not be unwelcome:—

The numerous hypotheses which have been advanced to explain why this dislocation should be, as Sir Astley Cooper avers, "the most difficult to reduce," may be summarised as follows:—The cuneiform or clubbed head of the metacarpal bone:[a] the mechanical resistance[b] and change of direction,[c] of the lateral ligaments; of the tendons of the short muscles:[d] the interposition between the metacarpal head and the base of the first phalanx, of the sesamoid bones;[e] of the anterior ligament;[f] of both the last-mentioned;[g] of the tendon of the flexor longus pollicis:[h] the constriction of the neck of the metacarpal bone, by the boundaries of the "button-hole" slit;[i] in the substance of the anterior head of the short flexor:[j] the contraction of the numerous muscles which act on the phalangeal portion of the thumb[k] and the difficulty of applying efficient mechanical force to the limited and unstable structures which are displaced.[l]

It is unnecessary to discuss all these speculations in detail, as they have been very frequently canvassed by many and exhaustive writers, and, when it is remembered that the ten above-mentioned difficulties admit of 1,023 combinations, it is easy to comprehend that much diversity of opinion respecting them should exist. This

[a] Hey, Syme.

[b] Hey, Cooper.

[c] Dupuytren.

[d] Malgaigne, Vidal, Hamilton.

[e] Humphry.

[f] Lawrie, Langer.

[g] Lawrie, Pailloux.

[h] Lisfranc, Deville, Wordsworth.

[i] Waitz.

[j] R. Smith, Doe.

[k] Cooper, Adams.

[l] Liston, Druit.

variability is well exemplified by the report[a] of two cases occurring in the practice of Professor Esmarch, in which special mention is made of a single structure, namely, the tendon of the flexor longus pollicis. In both instances operation by anterior incision verified the observations, which derive a peculiar value from their source. In one case the tendon was seen lying "loosely" and unobstructively to the inner side of the protruding metacarpal head; in the other, notwithstanding the adoption of similar treatment, the bone could not be replaced until the tendon, which was discovered lying between it and the base of the phalanx, was drawn to the inner side.

The description of this limited region, which is contained in even the most recent text-books of anatomy, is so defective that a summary of the more important points will render the subsequent observations more intelligible. Owing to the prominence of the condyloid facet for the external sesamoid bone, the metacarpal head is one-eighth of an inch wider on the radial, or outer, than on the ulnar, or inner side; and the superior margin of this eminence projects very abruptly forwards from the metacarpal neck. The antero-posterior diameter of the articular concavity on the base of the phalanx is only three-fifths of that of the metacarpal head. If the metacarpal head be removed by carefully separating from it all the ligaments, which are left attached to the phalanx, an articular fossa is displayed, the walls of which are deeper on all aspects than the antero-posterior measurement of the base of the phalanx, which can be completely covered by depressing the anterior or posterior boundary of the fossa. The walls of this fossa are composed of the different ligaments of the joint and of the sesamoid bones, which are intimately united in its entire circumference. The lateral ligaments, of which the outer is the stronger and the more distinct, radiate from their superior attachments to the antero-lateral aspect of the base of the phalanx; their anterior margins pass to the corresponding sesamoid bone, to the lower portion of the corresponding margin of which they are attached to a limited extent; they lie on the synovial aspect of those structures, which, from their analogy to the patellar ligament, may be termed the "sesamoid" ligaments, the inner being the longer, consisting of the parts of the tendons of the short flexor connecting the sesamoid bones with the anterior surface of the base of the phalanx. The posterior ligament, which is

[a] Waitz.

mentioned in very few works on anatomy, is a strong, independent structure, perfectly distinct from the dorsal tendons and their expansions, from which it is separated by a bursa; it is loosely attached to the periosteum on the back of the metacarpal bone, upon which its upper margin is gradually lost, its inferior margin is more firmly attached to the posterior surface of the phalanx, and at the sides it blends with the lateral ligaments, from which its margins cannot be distinguished. The anterior wall of the fossa is the most complex, consisting inferiorly of the sesamoid bones and fibrous tissue of almost cartilaginous density, and superiorly of the strong and relaxed anterior ligament, the margins of both parts being connected with the lateral ligaments by fibrous tissue, which is also strong and relaxed. The front of the sesamoid bones and the lateral portion of the anterior wall are intimately connected with the tendons of the flexor brevis, while the upper and middle part of the anterior ligament passes abruptly backwards to a notable extent from the tendons, to be attached to the neck of the metacarpal bone; this ligament gets thinner towards its upper margin, and is very extensile. The vessels which supply the outer side of the thumb occasionally pass between those' structures, and it is well to remember that they are sometimes of a considerable size. It is interesting to observe the similarity of their position to the articular arteries on the flexion aspect of the knee, which also are protected by the flexor muscles. Of the intersesamoid structures, the upper portion is of fibro-cartilaginous density, constituting, with some decussating fibres from the adjoining tendons, the transverse ligament; the lower part consists of strong but lax tissue. The theca of the tendon of the flexor longus pollicis is closely attached to the phalanx, the sesamoid bones, and the intersesamoid ligaments, while it is but loosely attached to the anterior ligament by strong fibrous tissue. The tendons of the short flexor project considerably in front of the articulation; they are connected by moderately strong transverse bands of fibrous tissue, which are continued upwards over the muscular portions, and blend inferiorly with the theca of the long tendon. Were it not irrelevant to the surgical nature of this paper, many additional anatomical points of great interest might be noticed, such as the existence of Haversian packets of fat, of fibro-cartilaginous bodies, and of synovial recesses in various parts of the cavity.

In the varieties of this injury the degree of dislocation depends, in posterior luxation, on the extent to which the head of the bone is permitted to escape from the articular fossa, by the rupture of the attachment of the anterior articular wall and of the lateral ligaments; and of the posterior ligament, in the anterior form. The difficulty of reduction is determined by the integrity of the anterior or posterior wall of the articular fossa, and the degree to which it is displaced from its normal position to the opposite surface of the metacarpal head; the most intractable form being that in which the strong anterior wall (consisting of the sesamoid bones and their connecting structures, the anterior ligament, and their connexions to the lateral ligaments and to the tendons of the short flexor) remains intact, and is drawn completely behind the head of the metacarpal bone; the most powerful extension serving only to depress those structures all the more firmly on the articular surface of the phalanx, which is closed by them as perfectly as a box is by its cover. Assuming that the transposition is complete, the less the lateral ligaments are lacerated the greater is the immobility, and consequently the more difficult is the reduction. In the anterior form a similar condition exists, but, owing to two circumstances, the reduction, although sometimes impracticable,[a] is generally effected more easily—(1) the posterior ligament is less resistant, and (2) the convexity of the articular surface being on the anterior aspect of the bone, which is that opposed to the ligament, allows the latter to glide more easily from its abnormal position.

The most frequent condition of the parts in complete posterior dislocation (Hey) is as follows:—The phalanx is drawn upwards on the back of the metacarpal bone, the head of which projects forwards. The anterior ligament is torn from its upper attachment, and lies, with the other structures constituting the anterior wall of the articular fossa, between the base of the phalanx and the metacarpal bone; the posterior ligament is separated from the periosteum of the metacarpal bone to an extent depending on the degree of displacement; the external lateral ligament is entirely torn, or its anterior margin, where the tension is greatest, is lacerated; the internal lateral ligament is generally uninjured,[b] thus influencing the inclination inwards, and the rotation, of the phalangeal portion of the thumb. The extensor tendons are relaxed; the tendon of the long flexor is either lying loosely to the inner side of the metacarpal head, or insinuated between it and the base of the phalanx, its position being most probably contingent

[a] Velpeau, Roux. [b] Lawrie.

on the persistence or laceration of the fibrous tissue which attaches the theca to its anterior ligament. The abductor and adductor muscles are but slightly influenced except by the change of their direction, consequent upon the displacement backward of their insertions; the inner or deep head of the flexor brevis is intact, and the outer or superficial is tightly strained round the external surface of the neck of the metacarpal bone, with or without laceration of some of its substance. Here it is well to consider the anatomy of the "buttonhole" slit. This opening has been described as existing in the "capsule," a term which most probably refers to the anterior ligament, which is too limited a structure to afford a collar to the metacarpal bone. The "buttonhole" proper is placed between the lower portions of the short flexor, which form its lateral boundaries; the upper extremity of the aperture is limited by the slip, unless it is lacerated, from the inner head of the flexor brevis, which joins the outer insertion, and by the aponeurotic bands which traverse the muscle. It is evident that neither by their mechanical resistance, nor by their contraction can any of those boundaries offer such insuperable difficulty to the reduction as is so frequently experienced, because laceration would readily remove the former, while anæsthesia would quickly dispose of the latter. Therefore, it is to the inferior extremity of the slit that one must look for the elucidation of this surgical paradox, and an investigation of the foregoing anatomical details compels us to recognise, as the cardinal difficulty in reduction, the interposition between the bones of the passive anterior wall of the articular fossa.[a]

The following manœuvre, which was first employed more than ten years ago, consists of the addition of circumduction to a methodised combination of recognised expedients, namely—(1) increasing the deformity by bending the phalanges backwards;[b] (2) pressing on the projecting ends of the bones;[c] (3) applying a rocking or zigzag motion to the phalanges;[d] (4) rotating them inwards;[e] (5) flexing them towards the palmar surface,[f] and, if necessary, (6) the application of extension.[g] It is well to realise that reduction is effected by constraining the projecting extremity of the metacarpal bone, to retrace its course through the "button-hole" opening, and to

[a] Lawrie.

[b] Roser, Sir C. Bell.

[c] Hey, Bell, Crosbie, Ledwich, Doe.

[d] Batchelder.

[e] Roux, Demarquey.

[f] Cooper, Liston.

[g] Cooper and many others.

resume its position within the deep articular fossa. Reflecting on the term "button-hole," which is so generally applied to this aperture, it is interesting to observe the resemblance which this expedient bears to the unbottoning of a coat, by drawing the most convenient margin of the yielding bottonhole round the projecting portion of the rigid button. The head of the bone corresponds with the button, and the slit to the yielding material—the most convenient and freest margin being the outer, the inner being generally fixed, by the persistent lateral ligament, to the internal side of the metacarpal head—which is also the narrower, a circumstance of which advantage is taken. The operator, grasping the thumb and attending particularly to the immobility of the metacarpal bone, having fixed the injured member in the flexed position, (1) presses his own thumb against the displaced phalanx, and bends the patient's backwards almost to a right angle, with a slight inclination inwards; the base of the phalanx is then moved along the internal margin of the posterior surface of the metacarpal bone, with a rocking motion until it reaches the inner edge of the articular surface, closely followed by the thumb of the operator, to prevent retraction and to aid by impulsion; when (2) adducting suddenly the base with a slight movement of its narrow inner margin upwards, to "hitch" it behind the internal lateral ligament, and rotating it inward, with the pressure applied chiefly to its external condyle, to impel it obliquely from above, forwards and inwards over the articular surface, and to force the outer boundary of the "button-hole" over the metacarpal head, while (3), extending the wrist, the operator gradually flexes the phalanx and sweeps the middle part of its base along the anterior articular margin until it reaches, in full flexion and abduction, the prominence for the external sesamoid bone; when (4) the phalanges are extended in a straight line with the metacarpal bone. Should additional extension be required an assistant can supply it in the most favourable manner, without interfering with the manipulation, by throwing a loop of strong tape round the posterior surface of the phalanx while it is in the angular position, and drawing it towards the inner edge of the metacarpal surface. The wrist is flexed during the first stage to relax the anterior muscles, the extensors being already relaxed by the position of the base of the phalanx, and, extended during the subsequent stages to permit of free circumduction, by relaxing the extensors, and because the tension thus produced by the short muscles is, at this stage, favourable to the traction forward of the base of the phalanx and to the liberation of the anterior articular wall. The phalanx is brought to a right angle, and circumducted on the internal lateral ligament to displace, if necessary, the tendon of the long flexor[a] and to induce the upper detached margin of the anterior ligament to pass from its position, between the bones, over the narrow inner edge of the metacarpal head, and it is swept round the anterior margin as far as the prominent external condyloid eminence to complete this transposition, and extended at this point that the projection may hook forward the ligament and allow the head to resume its position within the deep articular fossa. It is well to observe that in the second and third stages two movements of circumduction are employed, which coincide at a point posterior to the internal lateral ligament, the first passing inwards and upwards, with a sharp curve, and the second inwards, downwards, forwards, and outwards. They are represented by the accompanying diagram, Fig. 1, which indicates the curves for the left thumb.

Fig. 1.

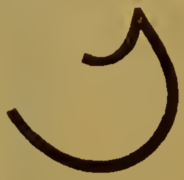
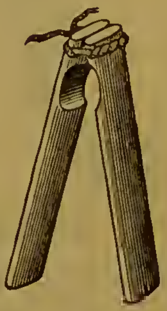


Fig. 2.



Should mechanical aid be necessary when a special thumb forceps is not available, the accompanying engraving represents a clamp, Fig. 2, which will prove an efficient substitute. It consists of two pieces of wood about six inches long and half an inch broad, which are connected, not too tightly, at one end by a cord, close to which are transverse concavities to receive the first phalanx.[b] It is made more secure and less painful by a strip of lint being wound round the grasping portions. It can be applied to the first phalanx, between the prominences of the head and base, and, by permitting the flexion of the terminal phalanx, it favours the relaxation of the tendon of the long flexor. It affords a firmer grasp than that derived from any forceps, retractor, or other apparatus with which the writer is acquainted, except that of M. Farabœuf, which has the same advantage as to the grasp, but is inferior in only allowing rotation on its axis and in the power being applied at a considerable distance from the position of utility, whereas this simple apparatus affords most powerful leverage with an important concentration of force. Should the operator wish to have both his hands at liberty to conduct the manipulations, he can secure that of the patient in a larger clamp of the same description, having, instead of the concavities to receive the phalanx, two bulbs, which may be easily added by rolling lint or worsted round its limbs in such a position that they will fix the first metacarpal bone immovably by pressing against it anteriorly and posteriorly; or if its flexion towards the palm be preferred,[a] they may be applied to it and to the fifth metacarpal bone. This larger clamp, which will be found useful in many minor operations on the hand, can be held between the knees of the operator, to which it can be attached more securely by a few turns of a bandage, or by being curved, as in Fig. 3.

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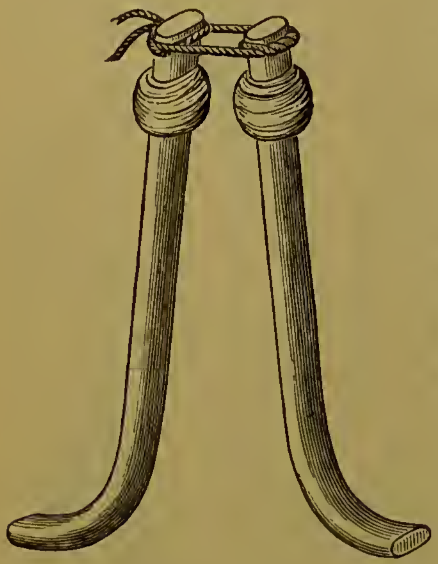
[a] Wordsworth.

[b] Messrs. Fannin, Dublin, will supply a more elaborate apparatus constructed upon this principle.

Fig. 3.



As the most serious resistance to reduction is due to the passive interposition of the anterior wall of the articular fossa, which retains its malposition independently of its lateral attachments, it is evident that the section of the lateral ligaments, the tendons of the short flexor, or of all those structures, as has been proved by unsuccessful operation,[b] does not materially aid in the reduction, while such an operation, performed anteriorly, is difficult, dangerous, and permanently injurious to the functions of the joint. If the intelligent trial of reduction by manipulation should fail, a subcutaneous operation on the posterior surface might be adopted, which is rational, easy, and safe, and which should not be such a source of persistent weakness. To the outer side, of, or between the extensor tendons, a tenotome might be passed through the skin down to the anterior margin of the base of the phalanx and through the intersesamoid space, until it would reach the back of the metacarpal bone, upon which might be divided all the structures forming the anterior wall of the articular fossa.[c] Thus the "button-hole" slit would be extended at least by half an inch in the most advantageous direction, and should reduction be still impossible the structures lying to the outer side of the head of the bone might be divided, and, if still more freedom be desired, the subcutaneous incision could be converted into an open wound, when the internal boundary of the "button-hole" could be reached from the most advantageous aspect. A hook[a] or lever[b] might be applied to the metacarpal head, and retractors also would aid the readjustment. A loop of wire passed through the "button-hole" should make direct traction backwards on the metacarpal head, while separating the lateral margins of the aperture.

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[a] Liston.

[b] Blandin.

[c] Miller, Flower.

An effort has been made to avoid the interruption of the train of thought in this paper by the exclusion from the text of quotations and authorities which serve but to disturb the attention and exhaust the patience of the reader. In the footnotes it has been attempted to acknowledge such ideas as have been reproduced knowingly, and of the balance a share is claimed as being the common property of the human mind. Originality at best is but a kaleidoscope, its highest product being nothing but a new combination of a few time-honoured truths.

[a] Humphry, Esmarch.

[b] Malgaigne.